



GROWING ORNAMENTALS IN URBAN GARDENS

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GROWING ORNAMENTALS IN URBAN GARDENS

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Agricultural Research Service

Society is changing rapidly. In many areas, space and resources are scarce commodities. People live in crowded conditions where wastes often pollute both the air and soil. Green, growing things have a difficult life. They are needed, however, to brighten and soften the environment—even to help purify the air we breathe.

All the skills and techniques urban gardeners can muster are needed to help plants adapt to this urban environment. For urban gardeners to learn the required skills, they must depend on horticulturists and other plant experts for information on how to propagate, grow, and protect plants. This bulletin gives specific information on the kinds of plants that will grow in an urban environment, methods and techniques used to grow them, and the protection plants need to survive.

Growing Area

The growing area for your urban garden can be a yard, terrace, patio, balcony, roof, window box, tub, hanging basket, or a combination of these.

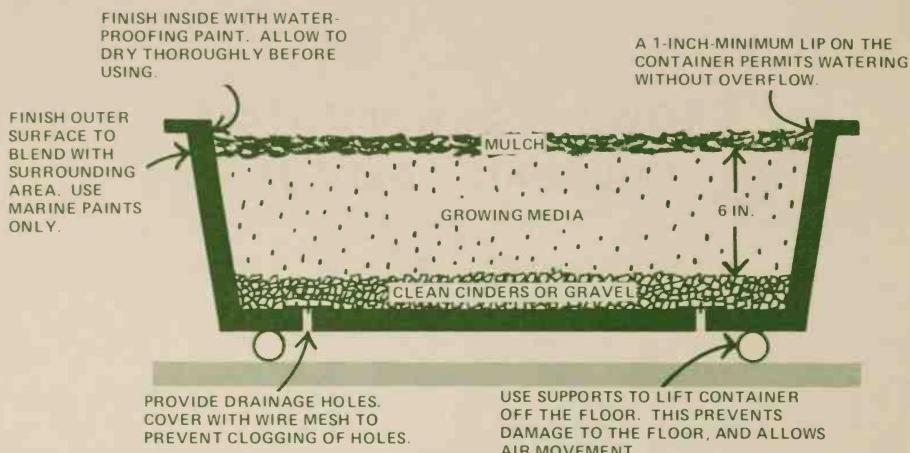
Containers can be made of plastic, fiber glass, metal, or clay. Ordinary

lumber and plywood are not recommended for planter boxes because these materials rapidly rot, lose their shape, are difficult to make waterproof, and need frequent replacement.

Portable, readymade containers are so widely available that it is not worthwhile for you to build your own. Many that are not designed especially for growing plants can easily be modified, particularly pails and tubs. The exteriors of these containers can be covered or painted to blend in with the surrounding area. When you use improvised containers of such waterproof materials as plastic or metal, make sure to provide for proper drainage. Drill one-half-inch holes at least 12 inches apart at the base of the containers. Otherwise, water will accumulate in the containers and rapidly decay them.

You can buy prebuilt planter boxes in various sizes to fit almost any space. If you get wooden boxes, paint both inside and outside with wood preservative and then paint the inside with tar asphalt paint. Finish the outside with marine paint of any color you prefer, but do not use mildew proof paints because they contain chemicals toxic to plants.

PREPARING CONTAINERS FOR PLANTING



Dark colored surfaces absorb heat and are best for cool shady areas. Light colored surfaces reflect heat and are best for warm bright areas.

If you wish, you can construct permanently built-in planter boxes of cement block, brick, stones, cement forms, and other material. Be sure to install drain pipes or small holes in the planters so excess water can drain away. You can varnish the outside surfaces of such materials as stone or brick, or you can leave them in their natural condition.

The disadvantages of built-in planter boxes are that they take a great deal of work to build and the weight of them may cause too much stress on balconies, floors, and other parts of the house. Also, they can be expensive and permission to install them is required from the landlord if the property is rented.

Portable containers are attractive, sturdy, and lightweight. They also are easily replaced and can be moved to any area you wish. They are preferred over built-in containers.

Hanging baskets are containers that

provide a place to grow vines and other plants for a different kind of effect in the garden. They permit you to display plants in space and view them from all sides.

Old style hanging baskets were made of wire frames lined with moss. They dripped water, were hard to handle, and could be used only on porches and patios. New types are made of plastic, have a flat bottom with a drainage area, and can be used anywhere. A plant can be started with the basket on the floor and then hung when the plant becomes established. Hanging baskets can be hung from horizontal bars or from walls.

Algae and mosses often grow on clay containers that are used for growing plants. You can buy a disinfectant that contains quaternary ammonium compound to control algae. Dilute the compound with water as directed on the package. Then dip new clay pots in the solution for 2 minutes and let them dry. Use these treated containers as you would any other container; the compound is harmless to plants. You also can wash down walks, walls, or

used containers to prevent the growth of algae and mosses without damaging fabrics or surfaces.

Preparation of Growing Media

If all or part of your garden is in the yard, inspect the soil very carefully before planting. You can expect it to contain little or no organic matter and to be poorly drained. It also may contain debris from construction—nails,

bricks, pieces of wood, and such toxic substances as oil and cleaning fluids. Do not try to grow plants in this kind of soil.

If the soil is too poor to grow plants, get new growing media. You can (1) use garden loam; (2) prepare a soil mix of topsoil, sand, and peat moss; or (3) buy or prepare artificial growing media. The three types of growing media are collectively referred to as soil in this publication.



A built-in container in a patio garden.

The type of soil you use depends on your preference, the size of your planting area, and the availability of materials. Any of these soils can be used in window boxes and other containers and outdoors in the yard.

Garden loam is expensive and heavy to handle but may be used when only small amounts are needed. When used in the yard, dig out the planting area 3 feet deep. Put a 4-inch layer of cinders or coarse gravel in the bottom of the dugout area to help excess water drain away. If possible, run a drain pipe from the bottom of the planting area to a lower ground level to provide better drainage. Then put a layer of coarse sand or perlite over the drainage material to keep the soil from sinking into it. Fill the rest of the planting area with garden loam.

When garden loam is used in containers, make sure the containers have one or more drainage holes in the bottom. Put in a layer of cinders or coarse gravel and a layer of sand or perlite on top of the cinders. Then fill the containers with garden loam. The amount of drainage material you need depends on the size of the containers.

If you prefer, you can prepare a soil mix of 2 parts sand, 1 part topsoil, and 1 part coarse peat moss. Prepare as much as you need. Add to these materials 1 pound (3 rounded cups) of 5-10-5 fertilizer for each 5- by 10-foot area to be planted. Thoroughly mix all ingredients. Prepare for drainage the same as when you use garden loam.

Artificial growing media is more convenient and simpler to use in urban gardens than garden loam or soil mix. It is lightweight until water is added, clean, and easy to move and store. It also is free of weeds and other pests,

and can be used in the yard and in all kinds of containers—either indoors or outdoors.

If you prepare your own artificial growing media, thoroughly mix the ingredients in the following proportions. Use one-half bushel of perlite or vermiculite, one-half bushel of ground peat moss, 4 ounces of 20 percent superphosphate, 4 ounces of dolomitic limestone, and 2 ounces of 5-10-5 fertilizer. Use artificial growing media in your yard or in containers the same way you use loam or soil mix.

Regardless of the kind of soil you use, be sure to prepare it properly. Otherwise, drainage will be poor and your plants will not thrive. Some plants will grow without any drainage material if the soil is properly prepared. But do not depend on drainage material to compensate for poorly prepared soil.

The best time to prepare your soil is in late summer or early fall. This gives you time to plant spring flowering bulbs and allows time for fall planted shrubs and evergreens to root before winter.

Planting

You can grow your plants from seed or you can set out started plants. Delay sowing seed or setting plants outdoors until after the last frost in spring.

If you plant seed, follow the planting directions on the package label. You should start seed indoors no sooner than 8 weeks before the average date for the last killing frost in your area. Then, when the weather is warm enough, you can transplant the plants outdoors either in containers or in the yard.



Tulips, daffodils, and grape hyacinths in a rock garden.

Details on how to start plants from seed are in HG 91, "Growing Flowering Annuals." Instructions on how to get a copy of HG 91 are given under "More Information," at the end of this publication.

When you buy established plants, they usually come in plastic or metal

cans or with the roots balled and wrapped in burlap (balled and burlapped). Plants in cans are more convenient to use because they are easy to move and do not have to be planted immediately. Balled and burlapped plants should be planted immediately.

Some cans are ridged so the plants

can be removed easily. Test by gently pulling on the plant. The rootball should slide out but if it resists removal, cut the sides of the can in four sections with metal shears and remove the rootball carefully. Avoid any stress on the stem and roots of the plant. If you force the plant from the can, you may break off the matted roots and cause the root system to die.

Examine the rootball. If a white net of roots is on the surface, make four cuts one-half inch long down the sides of the rootball. This will loosen the rootball and allow the roots to grow into the soil. If you find a mass of roots and drainage material such as stones or cinders at the base of the rootball, remove this material from the roots.

When the roots of the plant are balled and burlapped, you need not remove the burlap before setting the plant in the planting hole or container. After the plant is set, you can cut the twine around the top of the rootball and fold back or cut off exposed parts of the burlap.

Dig the planting hole twice as wide and slightly deeper than the size of the rootball or set the plant in a container that provides an equal amount of space. Refill the hole one-half its depth with garden loam, soil mix, or artificial growing media. If garden loam is used, mix in additional peat moss. Tamp the soil to provide a firm base for the plant and water thoroughly.

Then, place the plant in the hole or container and pack enough soil under the roots to allow the top of the rootball to sit slightly above the level of the ground or the point where the top of the soil will be in the container.

Then fill the rest of the hole or container with soil.

Pack the soil tightly around the rootball. Then water the plant thoroughly to settle the soil around the roots.

Prune the plant so it will not get too large for the container or planting area. Continue to prune the plant as needed to slow its growth. Otherwise, the plant will get too large and top heavy.

Fertilizing

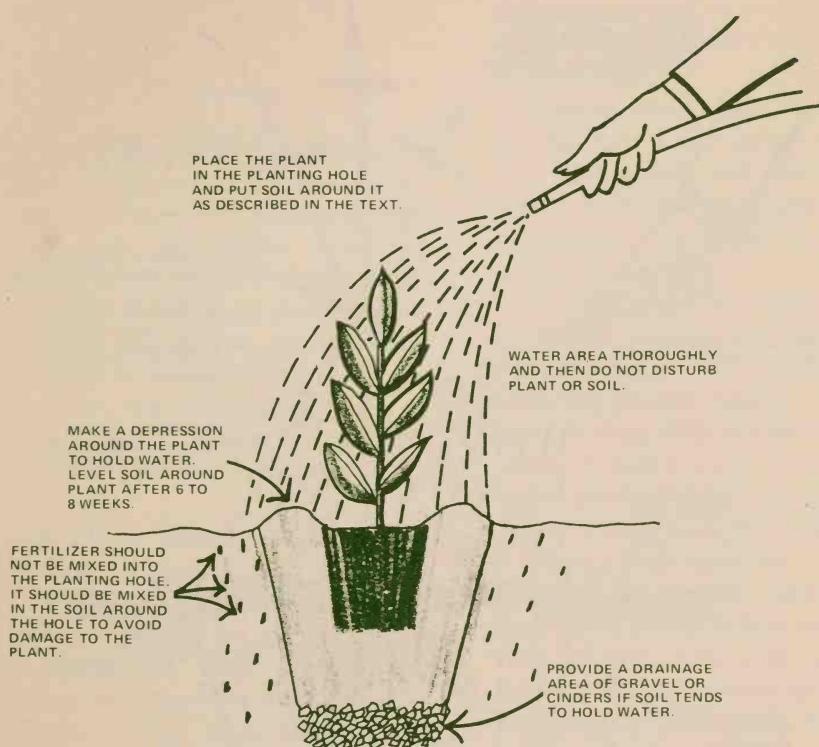
The best way to fertilize your plants is with liquid fertilizer because the plants can use it immediately and no fertilizer residue is left to burn the plant roots. Liquid fertilizer is available in a neutral formulation for most plants and in an acid formulation for such plants as azaleas, rhododendrons, hollies, and others that grow best in an acid soil.

You can apply liquid fertilizer when you water the plants. If you water your plants by hand, mix the fertilizer with the water as specified on the container label. You also can use automatic watering equipment that will mix the fertilizer and water in the right proportions.

If you apply dry fertilizer, use 5-10-5. Spread it on the planting area in early spring and mix it thoroughly with the soil. During the growing season, apply little rings of dry fertilizer around the plants at 6-week intervals. Apply fertilizer as evenly as possible and rake it into the soil.

Do not use such fertilizers as manure, bonemeal, tankage, or dried blood. The nutrients from these materials are slow to penetrate the plants and may burn them. Also, these fertil-

PLANTING LARGE CANNED SHRUBS IN THE GROUND



izers are hard to handle, have a disagreeable odor, often contain weed seeds, and do not contain all of the nutrients essential for plant growth.

Watering

Water your plants on a regular schedule. You may water them by hand or with automatic watering equipment.

When you water by hand, moisten the soil thoroughly but not so heavily the soil becomes soggy. Water again when the soil is dry to the touch and when the tips of the plants wilt slightly at midday. Pour the water directly on the soil. Do not spray your

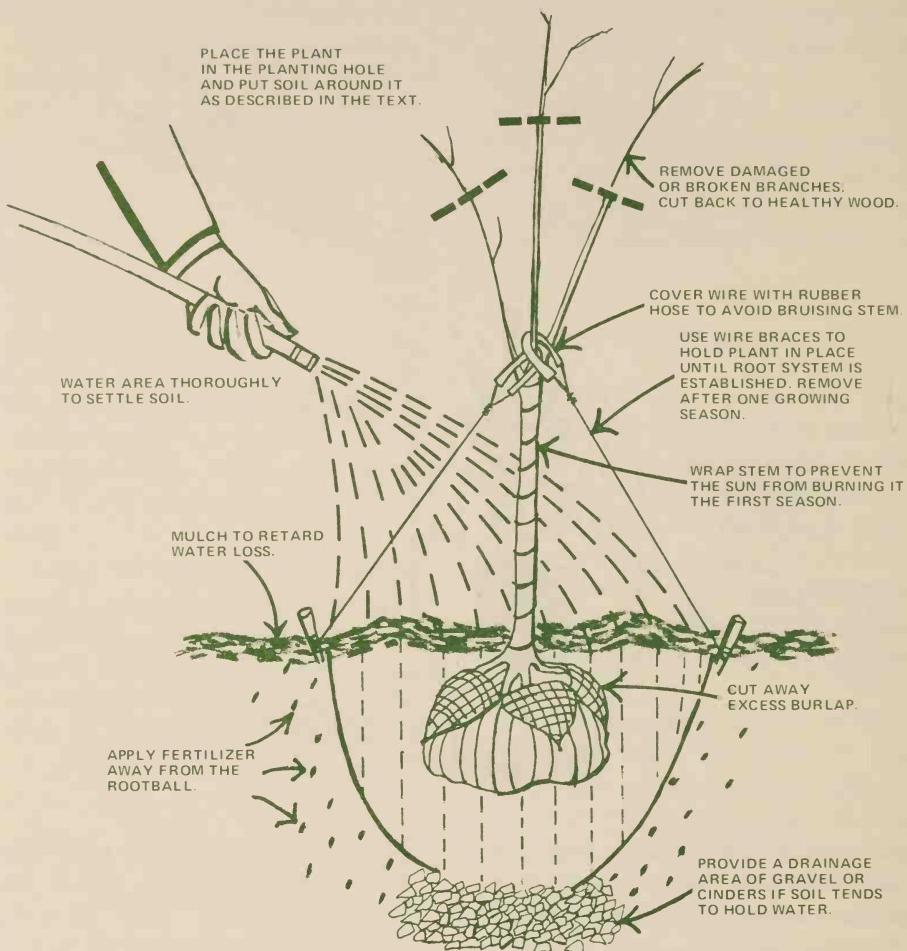
plants with a sprinkler in your urban garden. The repeated use of spray will raise the humidity, cause algae and mosses to grow, and will do little to aid the development of the plants.

If you have only a few plants in small containers, you can water them with a plastic funnel. This method is slow but it allows only the right amount of water to enter the soil. You also can use a funnel to learn how much water you need to apply to a plant growing in a container of a specific size.

Use a funnel this way—

- Insert the neck of the funnel into the soil.

PLANTING LARGE BALLED AND BURLAPPED TREES IN THE GROUND



- Fill the funnel with water. When it empties, fill it again.

- When water no longer drains from the funnel, stick your finger in the neck so the water will not run out, and remove the funnel.

The most efficient way to water your plants is with an automatic waterer. This allows you to leave your plants unattended for longer periods of time than is possible when you water by hand.

An automatic waterer includes:

- (1) A proportioner to mix the water with liquid fertilizer. It is attached to the water faucet. All moving parts should be stainless steel or plastic.
- (2) A solenoid valve to automatically control the flow of water. It operates electrically.
- (3) A line strainer to clean the water. It protects nozzles, solenoids, and pumps from damaging particles.

The screen must be removed and cleaned periodically.

(4) A 24-hour electric timer to control the time of watering and fertilizing.

Mulching

Mulch gives an orderly look to the garden. When you mulch, use such materials as coarse peat moss, pine bark, cocoa hulls, pine needles, or coarsely ground leaves. Select an organic material that decomposes slowly, allows water to penetrate to the soil below, and adds a neutral color to the soil.

Do not use such mulches as—

- Unground leaves that mat together and prevent water from getting to the soil.
- Finely ground peat moss that plugs all surfaces.
- Materials that have such large particles they will not stay in place.

Spread the mulch around your plants and water it into place. All mulches require care to keep them attractive. Litter in mulch is very noticeable.

Mulch during both summer and winter to—

- Retard water loss.
- Prevent soil from baking and cracking.
- Add texture to the planting area.
- Keep weeds from growing.
- Tie together the different parts of the garden.

Apply summer mulch about 1 or 2 inches deep in late spring or early summer after the ground has warmed and the plants are growing. Do not remove summer mulch at the end of the growing season. Let it rot into the soil.

Apply winter mulch several inches deep. Place it around the plants only

after the soil temperature has gone down, usually in late fall after several killing frosts. If you apply winter mulch too early, the warm soil will cause new growth to start and plants will be damaged when the new growth is frozen back.

Remove winter mulch as soon as growth starts in the spring. If you do not, new growth will develop long gangly stems, the plants will have insufficient chlorophyll, and many shoots will die.

A special decorative gravel or sand is available from garden supply stores for mulching. It comes in all colors, sizes, and textures and gives special accents to the garden. Spread this mulch about 2 inches thick except when stones are used. Stones should be in a thicker layer of up to 4 or 5 inches.

When a large open area is covered with decorative mulch, underline the mulch with plastic to help keep weeds from growing. You must provide a grade or trench for water to drain off the plastic. Otherwise, algae and mosses will cover the mulch.

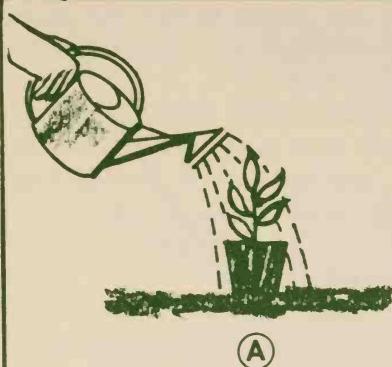
Decorative mulch requires daily care to keep it attractive. Litter accumulates rapidly. Be sure to keep some extra mulch on hand because mulch slowly disappears from compaction and handling.

Daytime Lighting

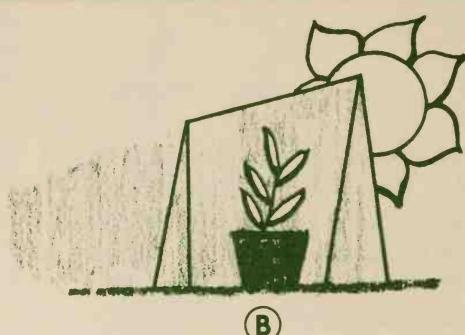
The amount of light in your garden will determine the kind of plants you can grow. Most plants need full sunlight but some plants will grow in partial sunlight and some others in shade. You should observe other gardens in your community to see what plants grow well under conditions similar to those in your garden.

TRANSPLANTING

I CARE OF PLANTS BEFORE PLANTING



THOROUGHLY WATER PLANTS.
ALL SURFACES MUST BE MOIST.



SHADE PLANTS FROM DIRECT SUNLIGHT
UNTIL THEY ARE TRANSPLANTED. DO
NOT HOLD PLANTS ANY LONGER THAN
NECESSARY SO ROOT DEVELOPMENT
AND TIME OF GROWTH AND FLOWERING
ARE NOT DELAYED.

2 PREPARATION OF PLANTS FOR PLANTING



TEAR UPPER
LIP OFF THE
POT.

REMOVE BOTTOM
OF POT OR INSERT
A STICK TO OPEN
BOTTOM. KEEP
POTS MOIST.

A

PLANTS IN PEAT POTS
OR PEAT PELLETS



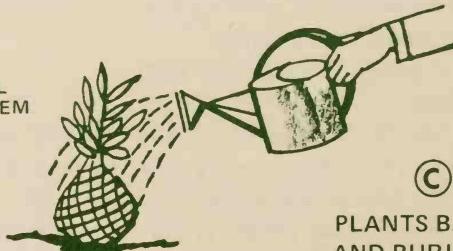
KNOCK PLANTS
OUT. DO NOT
PULL ON STEM.

MAKE FINE
CUTS 1/4 IN.
DEEP IN
SURFACE OF
SOIL BALL IF
ROOTS ARE
MATTED.

B

REMOVE ALL
DRAINAGE
MATERIAL
FROM BOTTOM.

PLANTS IN CLAY OR
PLASTIC POTS



C

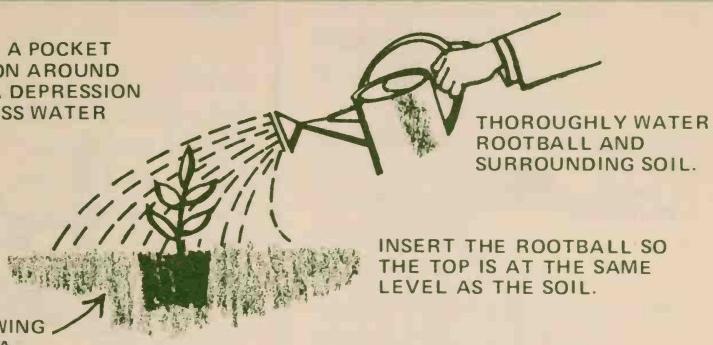
PLANTS BALLED
AND BURLAPPED

KEEP BURLAP MOIST AT ALL
TIMES. DO NOT PULL ON STEM
MORE THAN NECESSARY.
BALLED AND BURLAPPED
PLANTS HAVE MANY FINE
ROOT SYSTEMS THAT ARE
EASILY DAMAGED.

MALL PLANTS

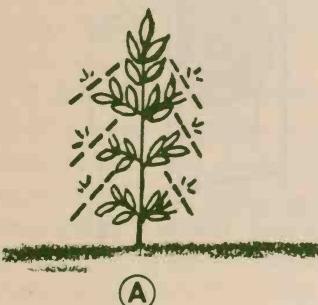
3 INSERTING PLANTS IN SOIL

DO NOT MAKE A POCKET OR DEPRESSION AROUND THE PLANT. A DEPRESSION ALLOWS EXCESS WATER TO STAND.

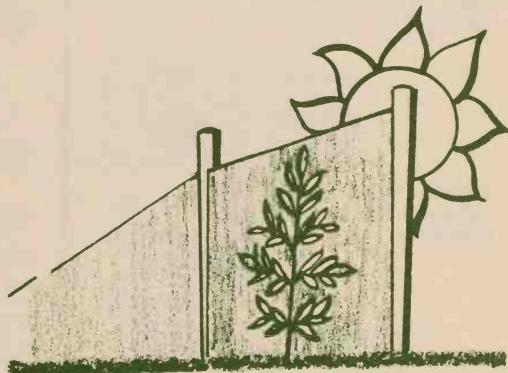


APPLY A LIQUID FERTILIZER AT TIME OF PLANTING TO HELP THE PLANTS DEVELOP ROOTS. USE 1 TABLESPOON OF 16-52-10 PER GALLON OF WATER.

4 CARE OF PLANTS AFTER PLANTING



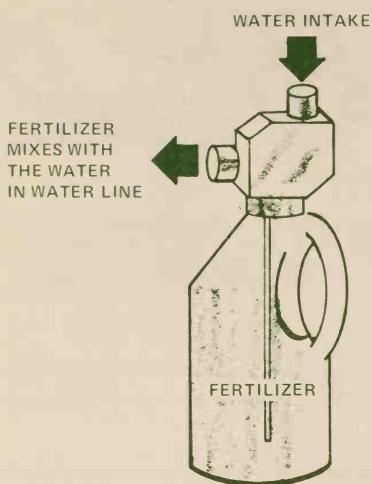
HAND PINCH 1/2 IN. OFF THE TIPS OF THE PLANTS WHEN THEY START TO GROW. DO NOT REMOVE LEAVES.



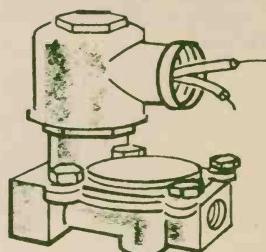
SHADE PLANTS FOR THE FIRST SEVERAL DAYS IF THEY ARE EXPOSED TO DIRECT SUNLIGHT. REMOVE COVER IN THE AFTERNOON TO HELP PLANTS ADJUST TO THE NEW ENVIRONMENT.

AUTOMATIC WATERING SYSTEM

1 PROPORTIONER



3 SOLENOID VALVE

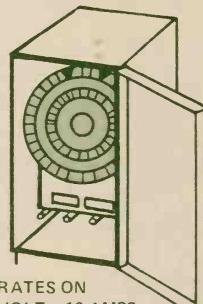


AUTOMATICALLY CONTROLS FLOW OF WATER

2 STRAINER



4 TIMER (24 HR.)



The degrees of sunlight and shade and the types of plants that will grow in them are described as follows.

Full sunlight is the absence of any shade from morning until night. All kinds of flowering, fruiting, and foliage plants will grow in full sunlight.

Partial sunlight is the presence of dense shadow or shade for part of the

day. Some flowering plants will grow but only a few fruiting plants will survive. The growth of all plants is slowed in partial sunlight.

Light shade is light shadow from distant buildings or the filtering of sunlight through leaves or screens. Green foliage plants will grow in light shade but few flowering plants survive.

Dense shade is deep shadow everywhere and no direct sunlight. The best solution is to grow foliage and flowering annuals in sunlight and then move them into densely shaded areas when they are fully developed.

Besides observing other gardens to determine the degrees of sunlight and shade in your area, you can measure the amount of sunlight with a light meter. Light is measured in foot candles (FC) and a light meter will show you the number of FC of light in different parts of your garden.

When you measure the light, do it on a day when the sun is shining brightly and check all parts of your garden from deep shade to full sunlight. The number of FC that are comparable to the various degrees of light and shade are as follows.

- 100 FC or less.—Not enough light for plants to survive.
- 100 to 500 FC.—Dense shade.
- 500 to 1200 FC.—Light shade.
- 1200 to 3000 FC.—Partial sunlight.
- 3000 FC or more.—Full sunlight.

If you do not measure the light with a meter, you should observe the amount and kind of shade you have in your garden each day. You can expect your plants to grow slowly and need replacement every few years in shady areas. Most flowering plants in shady areas should be discarded each year and new ones planted.

When you have shady areas in your garden, select shade-tolerant plants. Some plants that will grow in shade are as follows.

Deciduous shrubs

Abelia grandiflora (Glossy Abelia)
Amelanchier (Juneberry)

Berberis thunbergii
(Japanese Barberry)

Calycanthus floridus
(Carolina Allspice)

Cercis canadensis (Redbud)
Cornus (Dogwood)

Hydrangea quercifolia
(Oakleaf Hydrangea)

Ilex verticillata (Winterberry)
Ligustrum (Privet)

Symphoricarpos (Snowberry)
Viburnum

Evergreen shrubs

Aucuba japonica (Gold Dust Tree)
Berberis julianae (Barberry)

Buxus (Boxwood)
Camellia

Euonymus fortunei vegetus
Fatsia japonica

Ilex (Holly)
Kalmia latifolia (Mountain Laurel)

Leucothoe
Mahonia aquifolium (Holly Mahonia)

Nandina domestica
Photinia serrulata

Pieris
Taxus (Yew)

Vines

Aristolochia durier
(Dutchman's Pipe)

Gelsemium sempervirens
(Carolina Yellow Jessamine)

Hedera canariensis (Algerian Ivy)
Hedera helix (English Ivy)

Lonicera (Honeysuckle)
Pathenocissus (Boston Ivy)

Vitis labrusca (Fox Grape)

Flowering annuals

Begonia semperflorens (Wax Begonia)
Coleus

Impatiens holstii
Lobelia erinus

Nicotiana (Flowering Tobacco)
Torenia fournieri (Wishbone Flower)

Vinca rosea (Madagascar Periwinkle)

Flowering perennials

- Ajuga (Bugleweed)
- Anemone japonica
- Aquilegia (Columbine)
- Astilbe (Spirea)
- Campanula (Bellflower)
- Convallaria majalis
(Lily of the Valley)
- Dicentra (Bleeding Heart)
- Digitalis (Foxglove)
- Helleborus
- Heuchera (Coralbells)
- Hosta (Plantain Lily)
- Hypericum calycinum (St. Johnswort)
- Lunaria biennis (Honesty)
- Mertensia virginica
(Virginia Bluebell)
- Myosotis (Forget Me Not)
- Trollius (Globeflower)
- Viola (Violet)

Bulbs

- Begonia
- Caladium
- Chionodoxa luciliae
(Glory of the Snow)
- Colchicum (Autumn Crocus)
- Colocasia antiquorum
(Elephant's Ear)
- Galanthus nivalis (Snowdrop)
- Leucojum aestivum
(Summer Snowflake)
- Lilium (Lily)
- Muscari (Grape Hyacinth)
- Narcissus
- Ornithogalum (Star of Bethlehem)
- Scilla hispanica
(Spanish Bluebell)

Nighttime Lighting

Several kinds of lamps may be used for lighting gardens at night, including ordinary incandescent lamps, incandescent flood lamps, mercury lamps, and high-pressure sodium lamps. All of these lamps emit blue light except

high-pressure sodium lamps and amber, or yellow, ceramic coated incandescent lamps. Blue light attracts insects. Also, incandescent lamps of all kinds will alter plant growth if they are used for too many hours each day.

If you use incandescent lamps, light your plants only in the early evening. If you keep the light on later than 9:30 to 10:00 p.m., the extra light will cause the plants to grow and flower later in the season. Serious cold damage may result when plants continue to grow into the fall.

Ordinary white-frosted incandescent lamps are efficient light sources and are the most commonly used lamps in gardens. Many people object to amber coated incandescent lamps because they make warm colors appear dull and cool colors appear gray. Amber coated lamps will not attract insects; however, they cause plants to continue growing into the fall the same as white-frosted lamps.

Ordinary mercury lamps and high-pressure sodium lamps are extremely efficient light sources and they do not cause plants to grow and flower longer than the regular growing season. However, mercury lamps attract moths and other insects. High-pressure sodium lamps appear amber to the eye and do not attract insects.

Both mercury and high-pressure sodium lamps require special installation. They cannot be used in ordinary incandescent light fixtures.

Controlling Heat, Wind, Dust, and Noise

The environment of the urban garden is abnormal because it contains many objects of potential damage to plants. For example, many surfaces

radiate heat and the walls of buildings set up canyons that cause rapid changes in air circulation. Under these conditions, plants are soon damaged, especially if they are in direct sunlight.

You can use screens in your garden to help protect the plants against heat and wind damage. Screens can be made of reeds, wood, cloth, or plastic. Observe where your plants wilt rapidly and screen these areas from strong drafts and direct sunlight. You must arrange the screens so they permit some airflow. Otherwise the area will lack air circulation, become overheated, and plants and soil will become covered with mildew, algae, and mosses.

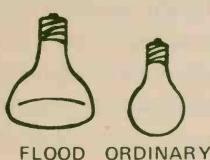
Water your plants frequently but only enough to keep the soil moist. If you give your plants more water than

they need to grow, they will not be trained to survive in the urban environment.

Because the frequent watering keeps the soil pliable, many plants may need staking. You can use stakes made of wood, bamboo, wire, or stiff plastic. Use stakes that are shorter than the plants so the stakes will not be seen. Drive the stakes into the soil behind the plants.

Loosely tie the plants to the stakes with plastic- or rubber-covered wire. Bare wire will cut the plants and string will rot and break. Make a double loop of the wire with one loop around the plant and the other around the stake. Tie a knot between the loops. Never make a single loop around both stake and plant. The plant will hang to one side and the wire may girdle the stem.

CHARACTERISTICS OF ARTIFICIAL LIGHTING

LAMP LAMPS OF VARIOUS SHAPES ARE AVAILABLE	COLOR OF LIGHT	ALTERS PLANT GROWTH	ATTRACTS INSECTS
INCANDESCENT  FLOOD ORDINARY	WHITE AND FROSTED	WHITE	YES
	YELLOW	YELLOW	YES
MERCURY 	ORDINARY	PALE BLUE	SLIGHTLY
	COLOR IMPROVED	PALE PINK	YES
HIGH PRESSURE SODIUM 	PALE YELLOW	NO	NO

You can reduce damage from heat, wind, and cold by covering your plants with a waterproofing spray made of latex, wax, or plastic. These anti-transpirant sprays are available from garden supply stores.

Apply the antitranspirant spray to the leaves and stems in spring and summer when the plants are growing rapidly, at the beginning of winter, and when plants are transplanted. The spray covers the plants with a clear, flexible film that prevents too rapid drying and protects against air pollutants.

Spray on several thin coatings at frequent intervals instead of only one heavy coat. In this way, you can keep the growing plant tips covered and prevent the spray from caking on the foliage.

Do not spray on a bright, hot day; the plant foliage may be damaged from the film. Once the film is on the plants, it has no effect on growth.

In the urban garden, plants soon become covered with dust and dirt. This grime dulls the foliage and shuts out light from the plants. Removal of dust is difficult and requires a great deal of time. Also, if you are not careful, you can damage the leaves and flood the soil with water.

To clean your plants, use soapy water heated to about bath temperature. Use only soap that is mild enough for a baby's skin. Do not use laundry powders or liquids because they may damage the soil and plant roots.

Apply the soapy solution to the plants with a hand sprinkler similar to the kind used for sprinkling clothes before they are pressed. Sprinkle only enough to moisten the foliage but not enough for the solution to drip. Wait 5

to 10 minutes for the soapy water to dissolve the dirt. Then use a water hose with a fine-particles nozzle to wash away the dirt and soapy water.

Very little information is available on how to control noise in the urban garden. Noises come from passing vehicles, industrial plants, and mechanical equipment. Fairly large growing plants or screens in the garden may help to deflect and rechannel some noises.

One major source of noise in the garden is the air conditioner. Screens 3 or 4 feet from the air conditioner compressor will redirect much of this noise. However, a better solution is to install the compressor away from the outdoor living area if possible.

Winter Care

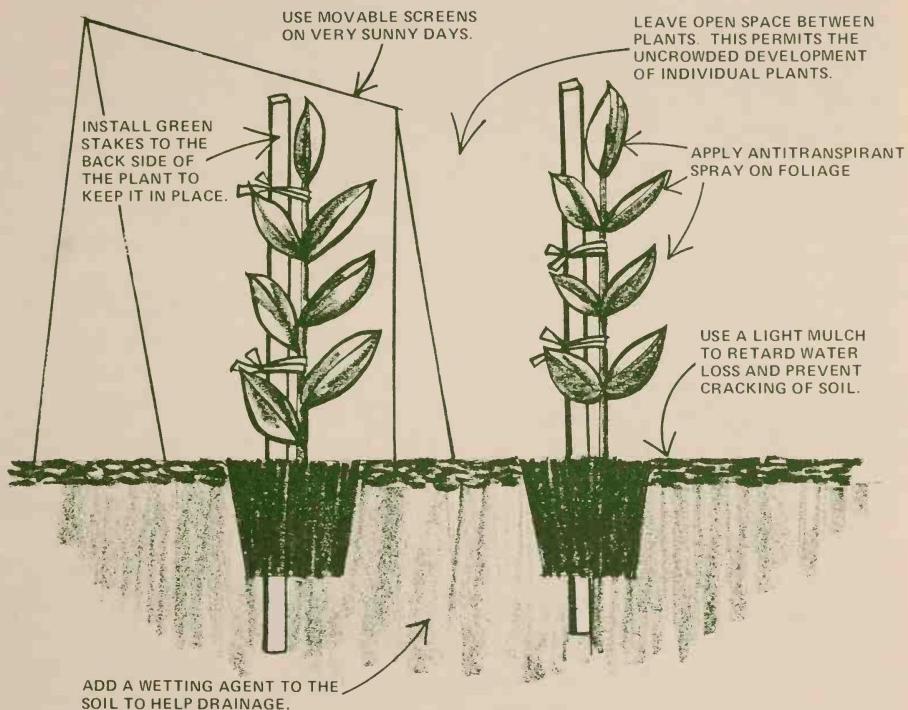
In early fall, start training your plants to withstand cold weather. The first step in cold-hardiness training is to stop using nighttime lights in September so your plants will get natural, short days. This will permit the plants to go dormant for winter.

Continue to water your plants in fall but stop fertilizing them. Never prune in late summer or fall because new growth will start and this soft wood is extremely sensitive to freezing.

Leave your plants exposed to the first several frosts of fall. These frosts are not as severe as those later on but they let your plants develop maximum cold hardiness. During this period, the soil temperature will be cold at night and warm in the day.

In late fall, after the soil temperature goes down and stays down, take steps to winterize your plants. The aim is to protect the soil from freezing and the tops of the plants from losing moisture.

PROTECTING PLANTS FROM DAMAGE



To winterize your plants, mulch them as explained in the section on mulching. Tie evergreen branches around the plants and cover deciduous plants with black polyethylene sheeting to keep off direct sunlight. Do not cover evergreen plants with polyethylene because they need sunlight in winter to keep their green color.

Move plants in containers to a shady location that is not windy and where water from snow or rain will not collect. Dig drainage furrows for your plants in the yard so water will not collect around them. Spray all plants with antitranspirant spray.

Most flowering plants should be replaced each year, but a few kinds of

flowering perennials in containers can be kept overwinter. These are such plants as fuchsias, roses, cannas, and dahlias. When the plants are dormant, let the soil dry out. Then turn the containers on their sides in a dry cool place and cover the plants and containers with moss, leaves, or plastic until spring.

Many potted house plants can be used from year to year. Keep them in the garden during summer, return them to the house in winter, and put them out in the garden again the next spring.

Cuttings of many plants such as coleus, impatiens, geranium, or ivy may be started in late summer or early

fall to provide new plants for the next year.

Signs of Poor Growing Conditions

Plants frequently become damaged because of the poor growing conditions that are often found in urban areas. Some of the things you can do to correct plant damage and poor growing conditions are as follows.

(1) *White coating on the surface of the soil.* This is a sign of too much fertilizer and a buildup of soluble salts. The root hairs of the plants will not develop properly and the plants will slowly die.

Remove the surface crust of the soil without disturbing the plant roots. Add fresh soil and then water thoroughly to leach away all excess fertilizer. Reduce the amount of fertilizer you use or switch to a liquid or water soluble fertilizer. These fertilizers contain only the essential elements for plant growth.

(2) *Green slime on containers and soil.* This indicates very acid soil, poor drainage, and too much water and fertilizer.

Dig up the soil and lightly dust it with ground limestone to reduce its acidity. Continue to water the plants thoroughly each time you water, but water less frequently.

(3) *Leaves that turn gray-green, wilt, and fall from the plants.* Roots are deficient in oxygen because of poor soil aeration. The plants do not get enough water and nutrients. Often, root rot kills the roots after they are weakened or damaged from poor aeration.

Replace the soil every 4 to 5 years when it becomes heavy and compacted. Add extra perlite and peat moss to the soil from time to time to provide good aeration.

At garden supply stores, you can get an organic, nonionic wetting agent that you can pour on the soil. This liquid increases the water holding ability of the soil and thoroughly wets the peat moss, which is often dry. It also permits easy movement of nutrients through the soil and allows excess water to flow easily out of the soil. Use the wetting agent according to the directions on the container label.

(4) *Retarded plant growth.* If the soil appears to be all right and proper cultural practices have been followed, slow plant growth may mean the water is too hard (contains too much calcium) or contains other impurities.

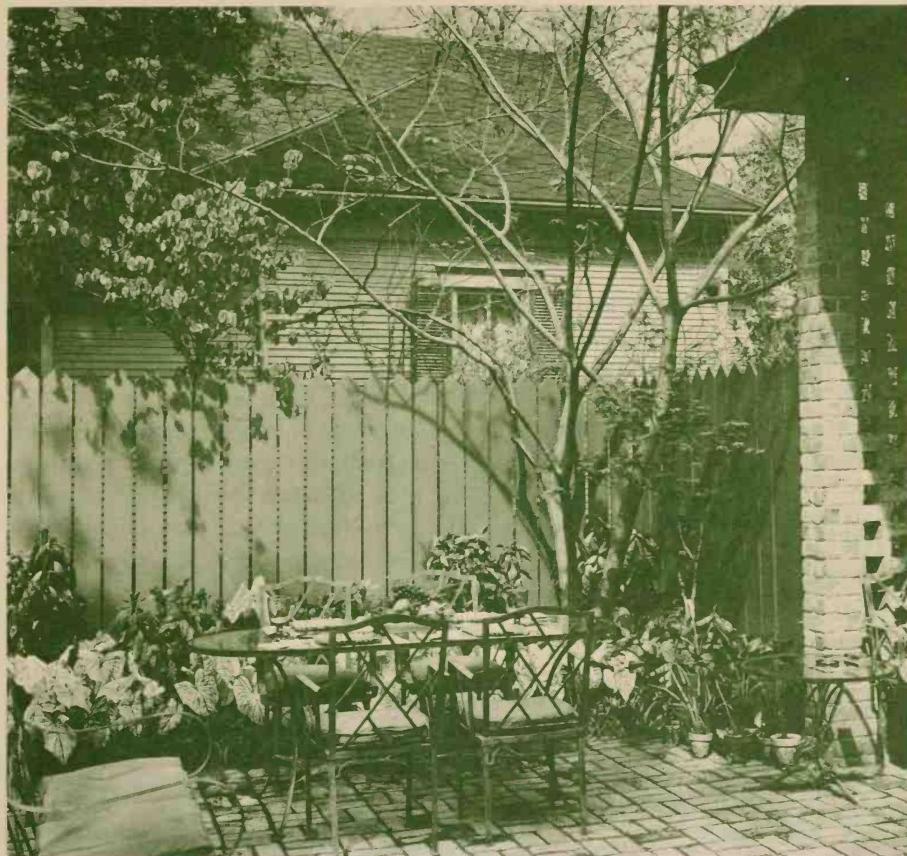
You can strain out some of these impurities by using a strainer on a hose or by having a strainer installed in the water line of an automatic waterer. The strainer should be removed from the waterer and cleaned periodically.

Do not use water softeners in the water because they substitute sodium for calcium and sodium damages plants more than calcium does. Deionizers are available that will chemically purify water but they are very expensive to use.

Rainwater is a safe source of water for plants if you have a way to collect and store it. It can be kept in tubs or barrels and used as needed.

(5) *Young leaves become twisted and flowers fall early.* This means that herbicides or other chemicals are drifting onto the plants from nearby areas.

Prune the abnormal foliage and let the plants overcome the damage if



A typical patio garden.

they are strong enough. There is no chemical treatment to help plants overcome pesticide damage. Only time and regrowth will help them recover.

(6) *Tan and white spots on leaves and rapid wilting.* This condition indicates air-pollution damage. Air pollution is discussed in the next section.

Air Pollution Problems

Air pollution comes from many sources and most of these sources are concentrated in urban areas. Automobile engines produce such gases as

carbon monoxide, hydrocarbons, nitrogen dioxide, and lead compounds. Electric generators and industrial plants contribute sulphur dioxide, hydrogen fluoride, and hydrocarbons. Refuse burning, heating plants, and forest fires emit tons of smoke into the air. All of the pollutants in the air are known collectively as smog.

The two pollutants that cause the most damage to growing plants are produced by the chemical action of sunlight on smog. These pollutants are ozone and peroxyacetyl nitrate, better

known as PAN. Ozone and PAN are known as photochemical pollutants.

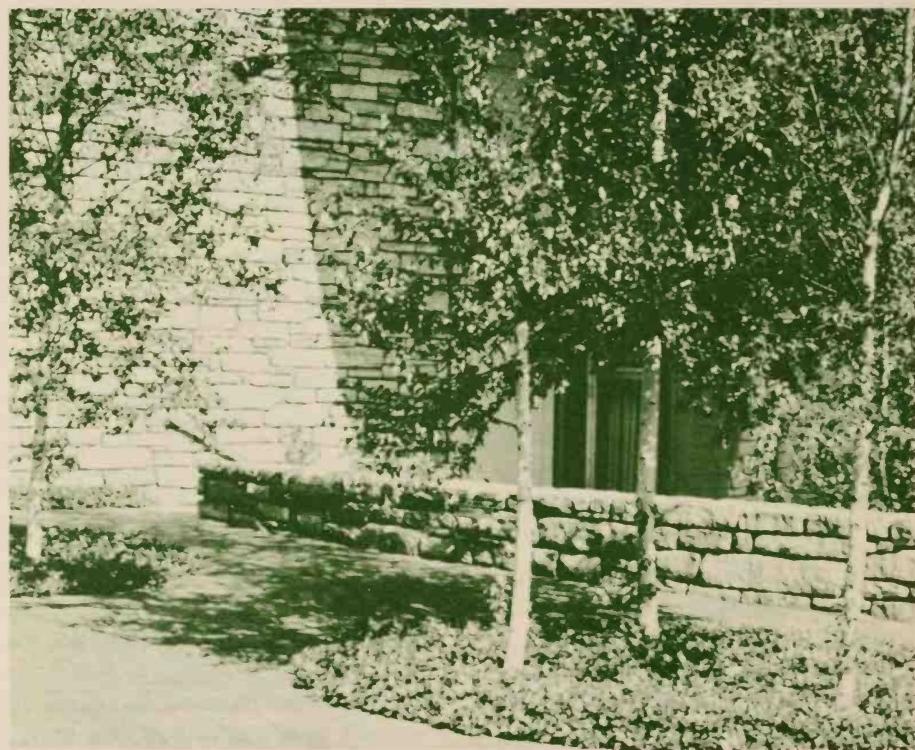
Some of the most common pollutants and the damage they cause to plants are as follows.

- Ozone and PAN.—Spotted, streaked, and bleached foliage; retarded plant growth; leaves drop early.
- Nitrogen dioxide.—Tan or white, irregular lesions near leaf margins.
- Sulphur dioxide.—Bleached spots between leaf veins; retarded plant growth.
- Hydrogen fluoride.—Bleached leaf tips and margins; dwarfed plant growth.
- Ethylene.—Withered and twisted leaves; flowers drop early.

You may have difficulty identifying

some of the particular kinds of air pollution damage that you see in your garden. A color guide showing damage to plants is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, at \$1.25 a copy. Ask for National Air Pollution Control Administration Publication No. AP-71, in color. Include your ZIP Code in your return address.

Pollution damage comes and goes, but more damage occurs in spring and fall than in other seasons. In spring and fall, stationary layers of warm and cold air create barriers to the movement of gases in the atmosphere. When this happens, smog collects beneath these barriers and damages plants.



English ivy used as a ground cover in an urban garden.

Some plants can tolerate smog better than others, particularly photochemical smog. Plants that are especially resistant to photochemical smog are in the first of the following two lists; plants that are acutely sensitive to photochemical smog are in the second of the two lists.

Plants Resistant to Photochemical Smog

Shrubs and trees

Acacia
Aralia
Arbutus
Buxus (Boxwood)
Camellia
Cedrus
Cistus
Cotoneaster
Cupressus (Cypress)
Fraxinus (Ash)
Ginkgo (Maidenhairtree)
Prunus
Pittosporum
Pyracantha (Firethorn)
Quercus (Oak)
Spiraea (Bridal Wreath)
Syringa (lilac)
Viburnum
Yucca

House Plants

Dieffenbachia
Dracaena
Fatsia
Philodendron
Pittosporum

Plants Sensitive to Photochemical Smog

Shrubs and trees

Acer (Maple)
Alnus (Alder)
Calycanthus (Carolina Allspice)
Ficus (Fig)
Gleditsia (Locust)

Hibiscus
Juglans (Walnut)
Mentha (Mint)
Petunia
Persea (Avocado)
Pinus (Pine)
Platanus (Sycamore)
Rhododendron
Robinia
Salix (Willow)
Salvia
Ulmus (Elm)

Within a given species of plant, some forms will be more resistant or sensitive than others. For example, common white petunias are extremely sensitive to smog but purple, blue, and red ones are more resistant. Besides color, size is a factor. Small-flowered petunias, called multiflora, are generally more resistant than large-flowered ones, called grandiflora. And small-leaved types of plants are more resistant than large-leaved types.

The stage of plant development is very critical to air pollution damage. Young leaves and old leaves usually are more resistant to pollutants than recently matured leaves. Slow growing plants are more resistant than soft, rapidly growing plants. Before you select plants for your garden, visit other gardens in the area and see what kinds of plants are growing best.

If your plants show signs of pollution damage, reduce the amount of nitrogen fertilizer and the frequency of watering. High levels of nitrogen and water stimulate plant growth and increase sensitivity to air pollution. Moderate fertilizer and watering will slow growth and help plants survive. There are no practical chemical treatments available that can be used on plants to increase their tolerance of the polluted environment.

More Information

Many local organizations such as garden clubs have publications on the culture and protection of plants in an urban environment. Some of these publications deal with problems for a specific area.

General information on growing ornamental plants is available in the Department of Agriculture publications listed in this section. You can obtain single free copies from your county agricultural agent or you can write the Office of Information, U.S. Department of Agriculture, Washington, D. C. 20250. Include your ZIP Code in your return address.

If free copies are not available for distribution, you can purchase copies at the price shown beside the name of each publication. Send your order and remittance to the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402. Include your ZIP Code in your return address.

- HG 65, Growing Chrysanthemums in the Home Garden (10 cents)
- HG 66, Growing Iris in the Home Garden (10 cents)

- HG 71, Growing Azaleas and Rhododendrons (10 cents)
- HG 80, Home Propagation of Ornamental Trees and Shrubs (10 cents)
- HG 83, Pruning Shade Trees and Repairing Their Injuries (10 cents)
- HG 86, Growing Camellias (15 cents)
- HG 91, Growing Flowering Annuals (10 cents)
- HG 104, Protecting Shade Trees During Home Construction (5 cents)
- HG 126, Growing Peonies (10 cents)
- HG 130, Growing Hollies (5 cents)
- HG 131, Growing Dahlias (5 cents)
- HG 132, Growing Magnolias (5 cents)
- HG 135, Growing Flowering Crabapples (5 cents)
- HG 136, Spring Flowering Bulbs (10 cents)
- HG 142, Selecting Shrubs for Shady Areas (10 cents)
- HG 149, Growing Pansies (10 cents)
- HG 151, Summer Flowering Bulbs (10 cents)
- HG 164, Home Planting by Design (25 cents)
- HG 165, Pruning Ornamental Shrubs and Vines (10 cents)
- HG 175, Growing Ground Covers (15 cents)